CHAPTER FOUR – RELIABILITY PLANNING

LAW

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable.

10631 (c) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.

10631 (c) Provide data for each of the following: (1) An average water year, (2) A single dry water year, (3) Multiple dry water years.

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplied:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

4.1 Water Supply Reliability

Two aspects of supply reliability are considered for both near-term needs (present to 2030) and long term needs (beyond 2030). The first relates to emergency reliability needs and is primarily a function of the availability and adequacy of supply facilities. The second aspect is climate-related, and involves the availability of water during mild or severe dry periods. [Checklist #53, §10635(a)]

4.1.1 STANDBY PRODUCTION

As described in the previous chapter, standby production capacity is required for system reliability. Under normal operating conditions, it is possible that one or two of the City's wells can be out of service during maximum day demand conditions due to equipment malfunction, servicing, or water quality concerns.

The California Department of Health Services (DHS) criteria recommends counting the capacity of the largest well as out of service. Well 13 has the largest capacity producing 1,500 gallons per minute (gpm). To mitigate the potential impact of lost production capabilities, the City should thus have wells with a capacity of 1,500 gpm in surplus of the maximum daily demand (MDD) requirements.

Using the DHS recommended calculations and the highest flow rates of the past 5 years; the City's MDD was approximately 2,740gpm (3,946 kgpd) in 2007.[6] Additionally, Fire Flow Requirements (FFR) add a demand of 1,500gpm. The total MDD with FFR is 4,240gpm. The current supply availability of 5,597gpm[7] is able to handle these demands. Although the recommended supply availability considers the largest well being out of service and drops supply to only 4,097gpm, in the event of a major fire the City plans to activate back up well, E6W. This brings the available supply to 5,227gpm and, therefore, exceeds the design demands of the system running at its peak while addressing a major fire at the same time.

Currently, the City's water supply is adequate to meet the immediate demands of the community, but the City's total available water capacity will be insufficient to meet the State recommended design capacities for the community in the future. The recommended design capacity factors in the possibility of a large fire and the loss of the largest producing well. The City needs to increase the water supply capacity to include redundancy provisions for standby production and source reliability.

[6] Calculated from Historical Water Production, Table 5.1-1; Calculations shown in Section 5.1.1
[7] Water Supply Wells, Table 3.1-1

4.1.2 CLIMATE-RELATED RELIABILITY CONCERNS

Not all hydrologic dry years lead to water supply shortages and groundwater overdraft. The annual quantity of groundwater available to the City does not vary significantly in relation to wet or dry years. During extended dry periods, groundwater levels generally decline, and will require more aggressive demand management practices. The reliability of the City's water supply, however, has remained consistent despite seasonal or climatic changes.

The City of Exeter has never suffered a severe water shortage. The nature of the groundwater supply is such that a sudden shortage is extremely unlikely. Any shortage that may be experienced will be due to failure to plan for increased demand due to population and industrial growth, or from catastrophic well or equipment failure.

4.2 Groundwater Quality Reliability Concerns

LAW

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631 and the manner in which water quality affects management strategies and supply reliability.

4.2.1 EXISTING WATER QUALITY REGULATIONS

In 1974, the Safe Drinking Water Act (SDWA) gave the United States Environmental Protection Agency (EPA) the authorization to set drinking water standards for contaminants in the drinking water supplies. Under the provisions or the SDWA, the California Department of Health Services (DHS) (recently renamed the Department of Public Health) has the primary enforcement responsibility. Appendix G includes a summary of the current (2007) maximum contaminant levels and regulatory dates enforced by DHS.

4.2.2 EXISTING LOCAL GROUNDWATER QUALITY

Historically the water quality in Exeter's wells has been very good and has consistently met drinking water standards. Water samples collected on May 31, 2007 are used to provide a snapshot of Exeter's water quality. Five wells, E6W, E9W, E10W, E11W, and E12W were sampled. The general water quality is good with pH values from 7.6 to 8.3 and specific conductance values ranging from 450 to 680. The sample from E12W is classified as moderately hard, all the other samples were in the hard or very hard classifications. Heavy metals were detected occasionally, i.e. iron and copper in E6W and barium in E6W, E9W and E10W (all below MCLs). Arsenic was detected in wells E11W and E12W. The arsenic concentrations, 2.5 parts per billion (ppb) in E11W and 3.5 ppb in E12W, are well below the arsenic standard of 10 ppb.[8]

[8] Existing Groundwater quality information derived from the 2008 Exeter Water System Master Plan

In 1994 levels of Dibromochloropropane (DBCP), a pesticide used to combat nematodes in agriculture in years past, began showing up in concentrations exceeding the maximum contaminant level (MCL) in well E10W. In 1995 the concentrations dropped below the MCL and E10W was returned to service. In 2000, concentrations of DBCP in well E9W exceeded the MCL. In August 2001 the levels dropped below the MCL. Then, in 2003, well E6W showed concentrations of DBCP exceeding the MCL. In the past, E6W has been used to meet summer peak demands, but only after public notification. However, with the addition of Well E13W, the use of E6W has been unnecessary. With sufficient availability of wells with good water quality, there are no projected supply changes due to water quality.

The water quality report for 2006 is attached in Appendix H of this report. Additional information can be found in the Water Permit No. 03-12-05P-005, written by the Department of Health Services in 2005. A copy of this report is on file with the City of Exeter Department of Public Works. Some recently enacted rules are included in the following subsections.

4.2.3 ARSENIC RULE

Arsenic is a constituent of many foods such as meat, fish, poultry, grain and cereals. Excessive amounts of arsenic can cause acute gastrointestinal damage and cardiac damage. Starting January 23, 2006, the Arsenic Federal MCL was set at 10 ppb. The City has recently tested the Arsenic levels and is below the new Federal mandated level.

4.2.4 STAGE 1 DISINFECTION/DISINFECTION BY-PRODUCTS RULE (D/DBPR)

Due to the City's population surpassing 10,000 persons, Stage 1 Disinfection/Disinfection By-products rule has become effective for the City of Exeter. This rule was enacted in 1998 and became effective in January, 2002. Stage 1 limits are as follows:

Total Trihalomethanes (TTHMs)	- 80 ug/L
Haloacetic Acids (HAAs)	- 60 ug/L
Bromate	- 10 ug/L
Chlorite	- 1.0 mg/L

The following residual disinfectant levels have been established to limit the applied dose of chlorine, chloramines and chlorine dioxide during drinking water treatment:

Chlorine	- 4.0 mg/L
Chloramines	- 4.0 mg/L
Chlorine Dioxide	- 0.8 mg/L

The City has recently tested these levels and is below the Federal mandated level.

4.2.5 STAGE 2 DISINFECTION/DISINFECTION BY-PRODUCTS RULE (D/DBPR)

Stage 2 Disinfection/Disinfection By-products Rule consists of monitoring chloroform at 0.070 mg/L, require public water systems to conduct a yearlong initial distribution system evaluation to identify monitoring sites with peak DBP levels, require public water systems to comply with 80/60 TTHM/HAA standards at each well site and raise the TTHM/HAA limits to 120/100 temporarily to allow time for utilities to make adjustments to come into compliance with the 80/60 TTHM/HAA standards.

4.2.6 LEAD AND COPPER RULE (LCR)

The objective of the LCR is to minimize the corrosion of lead and copper containing plumbing materials in public water systems by requiring utilities to optimize treatment for corrosion control. The LCR establishes action levels in lieu of MCLs for regulating the levels for both lead and copper in drinking water. The action level for lead was established at 0.015 mg/L and for copper is 1.3 mg/L. An action level is exceeded when greater than 10 percent of the samples collected from the sampling pool contain lead levels above 0.015 mg/L or copper levels above 1.3 mg/L. Once the action levels have been exceeded, an action level is required by the public water system to reduce lead and copper corrosion. The City of Exeter's lead and copper levels were at non-detectable levels in the year 2007, well below the action level.

4.2.7 FUTURE EFFORTS

To reduce water quality problems, future well locations should be undertaken in general accord with the following procedures:

- Employ a qualified hydrogeologist to tentatively locate a site.
- Drill a test well, under the direction of the hydrogeologist, to evaluate well potential for production and to, through sampling and testing, predict water quality and quantity from penetrated aquifers.

4.3 Catastrophic Interruption Concerns

Such concerns have been identified by the Water Code (Section 1063(c)) as involving regional power outages, earthquakes or other disasters. In any such case, the City's water supply system should be capable of providing, as a minimum, the average daily demand (ADD) through emergency power. Emergency power could be in the form of dual power, direct engine driven pumps or engine-generator sets.

The City's existing water system has two propane-powered engine driven pumps, wells E10W and E11W, and two diesel powered engine driven pumps, wells E9W and E13W. With the addition of the standby power at each of these wells, the wells are capable of producing 4,797gpm. The total storage requirements for this scenario are shown in Table 4-3.1. It is evident, with this scenario, that no additional auxiliary power sources will be needed for emergency requirements.

Table 4-3.1
Emergency Water Supply Flow Rates

Year	Average Daily Demand, ADD (gpm)	Capacity with Backup Power Sources (gpm)
2006	1,661	4,797
2007	1,583	4,797
2010	1,686	4,797
2015	1,851	4,797
2020	2,032	4,797
2025	2,230	4,797
2030	2,448	4,797

(1) ADD for 2006 and 2007 are derived from Table 5.1-1
(2) ADD for 2010, 2015, and 2020 are derived from Table 2.4-2 and Section 5.1.1
(3) Capacity values are derived from Table 3.1-1

4.4 Future Water System Planning

4.4.1 FUTURE GROUNDWATER WELLS

Limitations with respect to the development of additional water supply from the underground aquifers in the immediate area of Exeter include those associated with both quality and quantity. DBCP contamination is of concern throughout the community. This contamination concern lessens towards the southerly and westerly portion of the City. Thus, the City is looking to depend upon the southern and western sectors to provide its long-term water supply needs.

4.4.2 FUTURE USE OF SURFACE WATER

Using surface water in terms of developing a long-term water supply are limited. Surface water in the Kaweah River system as well as the Friant-Kern Canal is fully appropriated, primarily by agricultural users. There is, however, the potential for the City to buy surface water rights as individual farmers in the surrounding area take land out of production and convert it to other uses, or wish to sell for some other reason.

There are disadvantages to reliance upon surface water for Exeter's municipal water supply. The Friant-Kern Canal is periodically shut down for maintenance and wells must be relied upon during such shutdown periods. Other surface water supplies may be subject to supply limitations during dry periods. The City's limited financial resources make the acquisition of some types of surface water rights difficult, even if they are available. Surface water treatment facility construction and operation is costly; dependent upon its point of supply, transport to the City's system would involve significant capital investment. In short, long-term reliance upon surface water supply is not considered an approach which should be considered at this time.

Operating a surface water treatment plant would add a few other Federal and State mandated water quality requirements. Those requirements are listed as follows:

- Surface Water Treatment Rule
  Monitors turbidity, Giardia lamblia, viruses, Legionella and heterotrophic plate count bacteria in U.S. drinking water.
- Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR)
  Include filtering of the surface water to reduce levels of Giardia and Cryptosporidium
- Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
- Filter Backwash Rule

4.4.3 FUTURE PROGRAM PLANNING

As a result of the amendments of the Safe Water Drinking Act, source water protection has become a greater national priority. The amendments require a more comprehensive water shed based prevention approach to be applied to improving and preserving water quality of the public water supply source. The State of California has established a Source Water Assessment and Protection (DWSAP) Program in order to provide guidance to local communities better protect their water resources. The key elements of the program are as follows:

- Delineate the boundaries of the areas providing source water for public water supply systems.
- Inventory of the sources of regulated and certain unregulated contaminants of concern within the delineated areas.
- Determine the vulnerability of each water source to contamination.
- Public education and outreach.

The program could ultimately lead to the development of a comprehensive prevention and protection program that include monitoring.

Current plans for future water programming include monitoring water needs and the installation of new wells as needed. No projected improvements are needed until 2020 per figure 3.4-1.